REMARKS/ARGUMENTS

The claims are 1-3 and 6-11. Claims 1-3 and 7-11 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Hashimoto et al. U.S. Patent No. 4,350,665* in view of *Dunster et al. U.S. Patent No. 4,865,820.* The remaining claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over *Hashimoto et al.* in view of *Dunster et al.* and further in view of *Zardi U.S. Patent No. 4,372,920.*

This rejection is respectfully traversed and reconsideration is respectfully requested.

As the Examiner has recognized, the primary reference to *Hashimoto et al.* fails to disclose that the process in the reactor is an oxy-dehydration process, that the airstream is jetted directly onto the catalyst at an inclined angle, and that the oxygen is jetted in a plane 50-300 mm above the catalyst bed with the dwell time less than 1 second in the space above the catalyst bed. In *Hashimoto et al.*, outflow of the second gas is <u>perpendicular to or in the opposite direction</u> of the main stream (see column 3, lines 8-11 of *Hashimoto et al.*) and not in the direction of the catalyst bed. For this reason, the space

between the distributor and the catalyst bed in *Hashimoto et al.* is completely filled with gas that contains oxygen, and therefore an oxygen dwelling time of ≤ 1 second in a space above the catalyst bed cannot be achieved with *Hashimoto et al.'s* arrangement.

Although the Examiner relies on the secondary reference to *Dunster et al.* as remedying the deficiencies of *Hashimoto et al.*, it is respectfully submitted that the Examiner's position is unfounded. In *Dunster et al.*, the first gas flows through pipes (80) (see FIG. 5 of *Dunster et al.*) and the second gas is fed into the pipes through orifices (86). There are no free jets that flow in the direction of the catalyst bed, but rather widened regions (84) into a body (78) in *Dunster et al.'s* arrangement.

Moreover, the dwell time in *Dunster et al.* consists of:

- relatively short dwell time in the pipe (80), because the velocity is high; and
- dwell time in the conically widened regions (84), whereby
  - the volume of the cones V = 1/3 * Pi/4 * D^2 * H = approximately 0.26 D^2*H is approximately

4 times less than the volume of the entire layer between the pipe exits and the catalyst bed surface;

- the velocity of the gas in the cones is many times greater than the average velocity at the catalyst bed surface; and
- the resulting dwell time is shorter, by an order of magnitude, than the one in the entire layer, as in *Hashimoto et al.*

It is respectfully submitted that one skilled in the art would not have looked to *Dunster et al.* to modify *Hashimoto et al.*, particularly in view of the following disadvantages of the method according to *Dunster et al.*

In *Dunster et al.*, a body having hollow cones (78) is required, in order to prevent circulation of the gases that contain oxygen between the jets. In order for the gas that contains oxygen to flow along the widened region, without detachment, on the shortest path, in the direction of the catalyst bed, the widening angle of the cones (98) should be less than 15° and preferably 7°, as is known in flow theory. See column 5, line 45 of *Dunster et al.* Moreover, *Dunster et al.*

requires the body having hollow cones to be made up of a high temperature alloy (see column 4, line 65 of *Dunster et al.*) for temperatures at typically 500°C.

In contrast, with Applicants' method as set forth in claim 1 and synthesis reactor as set forth in claim 11 for carrying out the method, short dwell times as in *Dunster et al.* are achieved, or even shorter, because the mixing distance (92) in pipes (80) in *Dunster et al.'s* arrangement is absent. Rather, the short dwell times are achieved in the free space with free jets, without the body (78) having hollow cones (84) of *Dunster et al.'s* arrangement.

Moreover, Applicants' method and synthesis reactor uses a flow angle that plays an important role. Where outflow of the second gas is perpendicular or in the opposite direction, as in *Hashimoto et al.*, the dwell time of the oxygen is long, because the entire space between nozzles and the catalyst bed contains oxygen. In the case of outflow of the gas vertically, as in *Dunster et al.*, a body having hollow cones is required, in order to prevent circulation of the mixture between the cones. See FIG. 3 of Applicants' disclosure. In contrast, with Applicants' arrangement, the gas that spreads out on the catalyst bed

surfaces is pushed under the adjacent jets and short dwell times are achieved without any of the disadvantages of *Dunster et al.'s* arrangement.

Accordingly, it is respectfully submitted that claims 1 and 11 are patentable over *Hashimoto et al.* and *Dunster et al.*

The remaining reference to *Zardi*, cited with respect to claim 6, has been considered but is believed to be no more relevant. There is no disclosure or suggestion of Applicants' method as recited in claim 1, wherein oxygen is jetted onto the catalyst surface through exit openings in the ring distributor at an inclined angle from the vertical in a plane about 50-300 mm above the catalyst bed to ensure an oxygen dwelling time of $\leq$ 1 second in the space above the catalyst bed or a synthesis reactor as recited in claim 11 designed to carry out this method.

Accordingly, it is respectfully submitted that the claims are patentable over the cited references.

In view of the foregoing, it is respectfully requested that the claims be allowed and that this application be passed to issue.

Respectfully submitted,
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